

3.5 derivatives of trig functions

$$\frac{d}{dx} \sin x = \cos x$$

$$\frac{d}{dx} \cos x = -\sin x$$

simple harmonic motion

$$s = 5 \cos t$$

$$v = -5 \sin t$$

$$5(-\sin t)$$

$$a = -5 \cos t$$

$$j = 5 \sin t$$

$$\frac{d}{dx} \tan x = \sec^2 x$$

$$\begin{aligned} \frac{d}{dx} \frac{\sin x}{\cos x} &= \frac{\cos x \cos x + \sin x \sin x}{\cos^2 x} \\ &= \frac{\cos^2 x + \sin^2 x}{\cos^2 x} \\ &= \frac{1}{\cos^2 x} \\ &= \sec^2 x \end{aligned}$$

$$\frac{d}{dx} \cot x = -\csc^2 x$$

$$\frac{d}{dx} \sec x = \sec x \tan x$$

$$\frac{d}{dx} \csc x = -\csc x \cot x$$

memorize all 6

$$\frac{d}{dx} x^2 \cos x = -x^2 \sin x + 2x \cos x$$

$$\frac{d}{dx} \frac{\tan x}{x} = \frac{x \sec^2 x - \tan x}{x^2}$$

$$\frac{d^2}{dx^2} \sec x =$$

$$y = \sec x \quad y' = \sec x \tan x$$

$$y'' = \sec x \cdot \sec^2 x + \tan x \sec x \tan x$$